

Spot Safety Project Evaluation

Project Log # 200501265
Spot Safety Project # 04-99-204

**Spot Safety Project Evaluation, of the Traffic Signal Installation,
At the Intersection of US 70 and SR 2309-Peedin Road-Creech's Mill Road, Johnston County**

Documents Prepared By:

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Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-99-204 – The Intersection of US 70 and SR 2309-Peedin Road-Creech's Mill Road, Johnston County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a traffic signal. Mr. Larry Stancil, a resident of Selma, originally requested the improvement. US 70 is a four lane divided highway with exclusive left and right turn lanes in both directions at the intersection with SR 2309-Peedin Road-Creech's Mill Road. SR 2309-Peedin Road-Creech's Mill Road is a two-lane facility on both approaches to the subject intersection. Both roads have a speed limit of 55 mph within the vicinity of the intersection. Prior to the spot safety improvements, the subject location was controlled by stop signs on SR 2309-Peedin Road-Creech's Mill Road.

The intersection met the following signal warrants:

Warrant 2 (Interruption of Continuous Traffic) – Warrant met for two hours (eight hours required)

Warrant 9 (Four Hour Volumes) – Warrant met for one hour (four hours required)

The initial crash analysis for this location was completed from November 1, 1992 through October 31, 1998 with a total of 30 reported crashes. According to the initial crash analyses, there were 24 Angle crashes and one Left-Turn crash, resulting in two class A injuries, 22 class B injuries, and 22 class C injuries. The sight distance for motorists' accessing US 70 from SR 2309-Peedin Road-Creech's Mill Road is limited. The high traffic volume on US 70 combined with the limited sight distance created an increased accident potential at the intersection. The final completion date for the improvement at the subject intersection was on May 26, 2000.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from April 1, 2000 through July 31, 2000. The before period consisted of reported crashes from January 1, 1996 through March 31, 2000 (4 Years, 3 Months) and the after period consisted of reported crashes from August 1, 2000 through October 31, 2004 (4 Years, 3 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of US 70 at SR 2310-Davis Mill Road, US 70 at SR 2312-SR 2519-Braswell Road-Country Store Road, US 70 at SR 2313-Braswell Road, and US 70 at SR 2314-Pondfield Road. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	26	41	57.7
Total Severity Index	10.53	4.79	- 54.5
Frontal Impact Crashes	22	19	- 13.6
Frontal Severity Index	8.48	5.28	- 37.7
Volume	22,500	23,300	3.6

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	36	30	- 16.7
Total Severity Index	14.82	19.86	34.0
Frontal Impact Crashes	23	21	- 8.7
Frontal Severity Index	17.72	22.57	27.4
Volume	22,200	21,400	- 3.6

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	26	41	---
Comparison Total Crashes	36	30	89.2 %
Treatment Frontal Impact Crashes	22	19	---
Comparison Frontal Impact Crashes	23	21	- 5.4 %

The naive before and after analysis at the treatment location resulted in a 57.7 percent increase in Total Crashes, a 54.5 percent decrease in the Total Severity Index, and a 3.6 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 16.7 percent decrease in Total Crashes, a 34.0 percent increase in the Total Severity Index, and a 3.6 percent decrease in ADT. The before period ADT year was 1998 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the comparison locations are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 89.2 percent increase in Total Treatment Intersection crashes and a 5.4 percent decrease in Frontal Impact Treatment Intersection crashes.

Results and Discussion

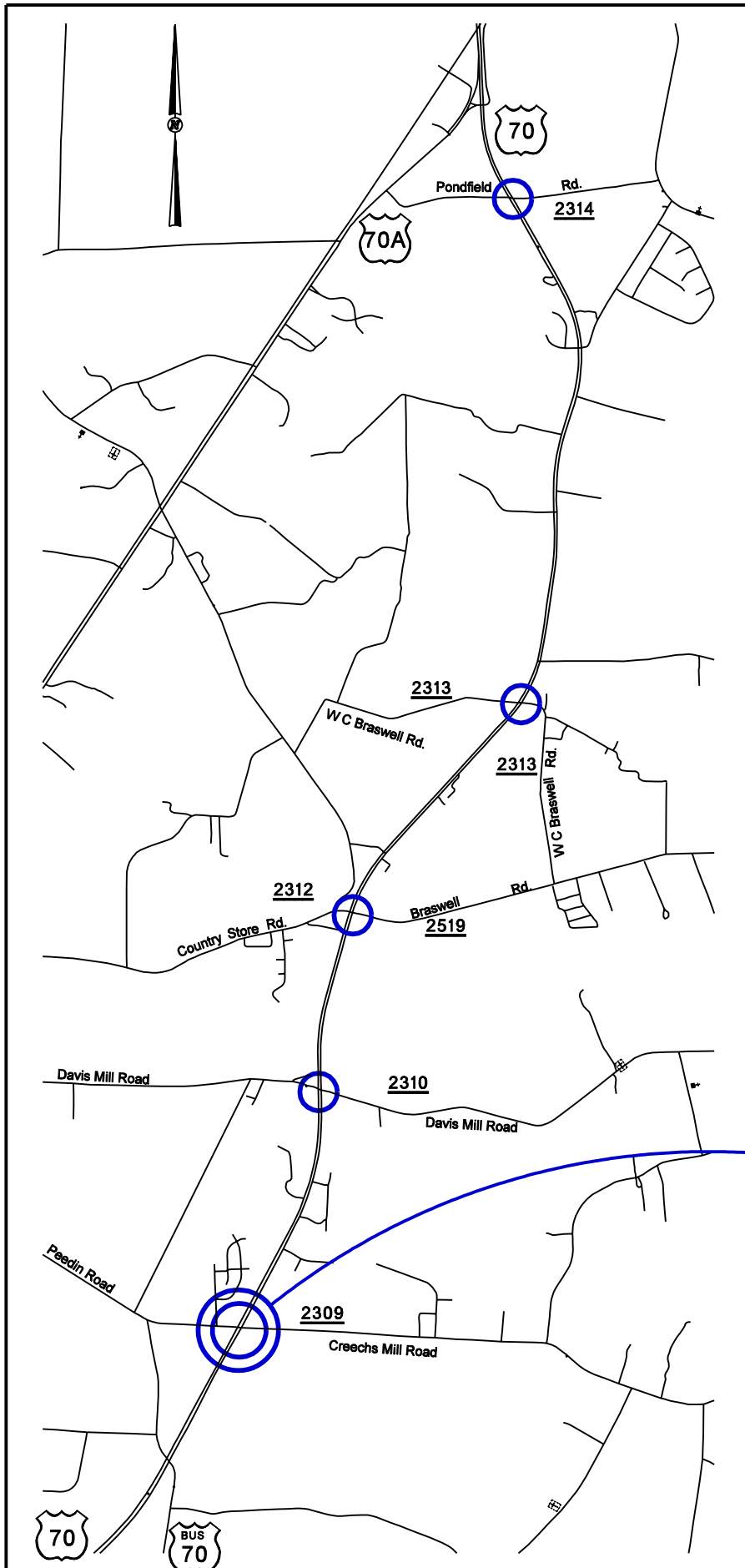
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 57.7 percent increase in Total Crashes and a 13.6 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in an 89.2 percent increase in Total Crashes and a 5.4 percent decrease in Frontal Impact Crashes at the Treatment Intersection.

The summary results above demonstrate that the treatment location appears to have had a substantial increase in the number of Total Crashes from the before to the after period using both analysis methods. However, the treatment location also appears to have had a decrease in the number of Frontal Impact Crashes from the before to the after period using both analysis methods. Further analysis of crash types in the before and after period reveals that the number of Angle crashes decreased by 61.1 percent, the number of Left-turn crashes increased by 200.0 percent, and the number of Rear-End crashes increased by 900.0 percent. The Total Severity Index decreased by 54.5 percent, which may be attributed to the lower concentration of Angle Crashes in the After Period. The increased number of Left-turn crashes on US 70 may be attributed to the Protected-Permitted signal phasing. In addition, the increased number of Rear-End crashes may be attributed to the high speeds on US 70 combined with motorist's lack of recognition of the traffic signal.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. In addition, notice the gas station access points located within close proximity to the intersection. In the Before Period an Angle Crash occurred at the gas station entrance on US 70 (involving a vehicle exiting the gas station and a westbound travelling vehicle), resulting in a class B and class C injury.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 57.7 percent increase to an 89.2 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 5.4 percent decrease to a 13.6 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Evaluation of Spot Safety Project Number 04-99-204
Location Map, Johnston County



Comparison Sites:

US 70 at SR 2310-Davis Mill Road;
US 70 at SR 2312-SR 2519-
Braswell Rd-Country Store Rd;
US 70 at SR 2313-Braswell Rd; and
US 70 at SR 2314-Pondfield Rd

Treatment Site:

US 70 at SR 2309-Peedin Road-
Creech's Mill Road

Treatment Site Photo (Taken on May 18, 2005)



Looking north on SR 2309-Peedin Road-Creech's Mill Road
Notice the gas station located in the northeast quadrant.



Looking south on SR 2309-Peedin Road-Creech's Mill Road

Treatment Site Photo (Taken on May 18, 2005)



Looking east on US 70



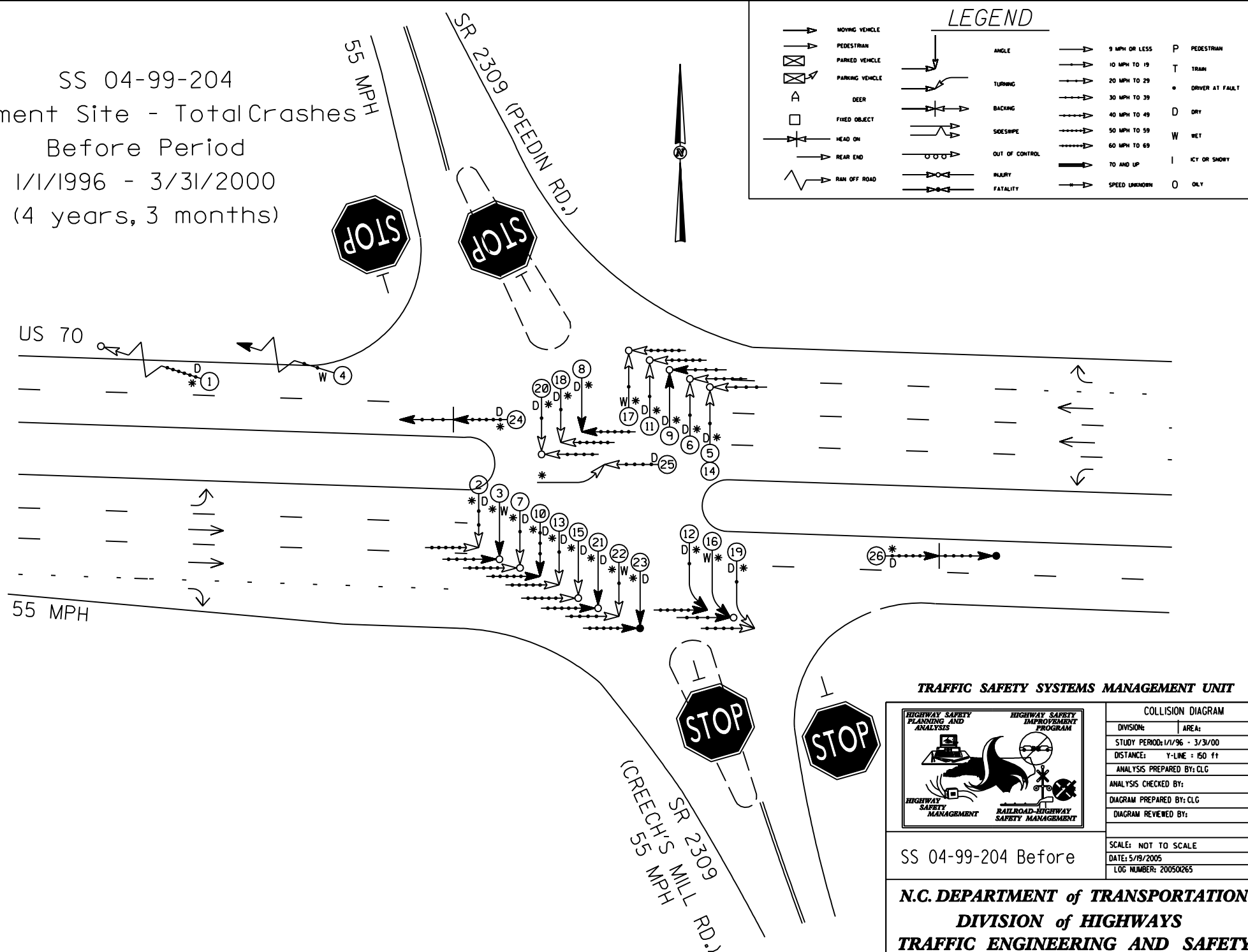
Looking west on US 70

Treatment Site Photo (Taken on May 18, 2005)

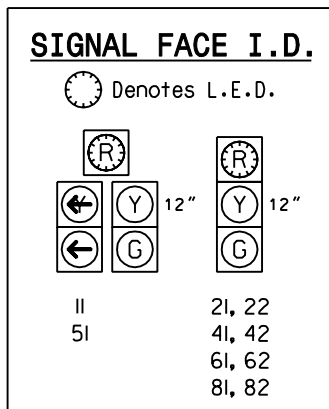
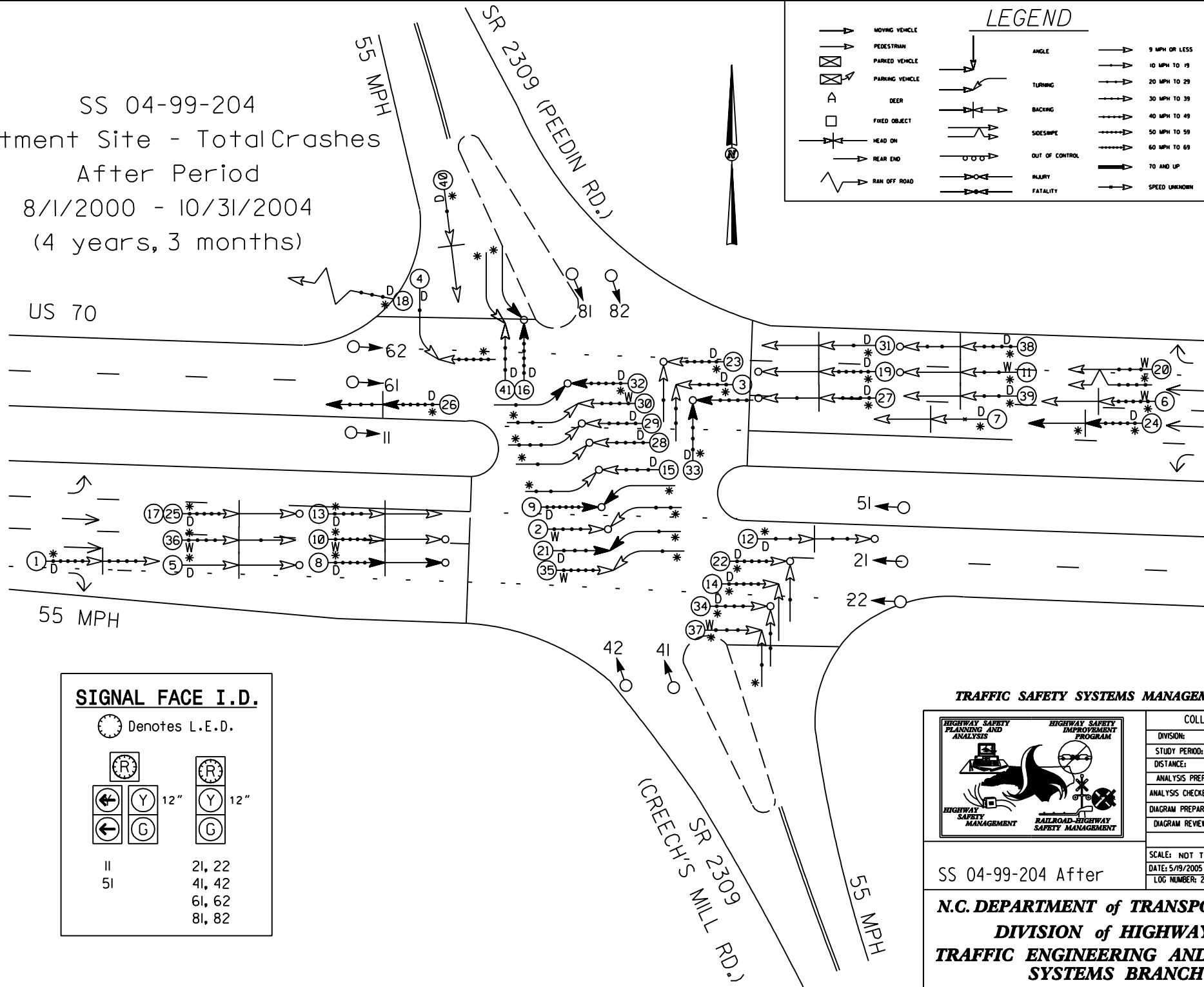
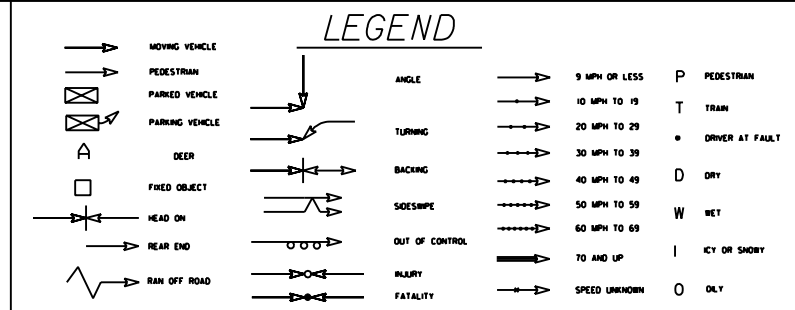


Approaching the Treatment Intersection while driving east on US 70.

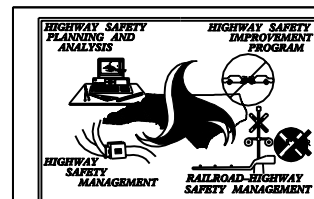
SS 04-99-204
Treatment Site - TotalCrashes
Before Period
1/1/1996 - 3/31/2000
(4 years, 3 months)



SS 04-99-204
Treatment Site - TotalCrashes
After Period
8/1/2000 - 10/31/2004
(4 years, 3 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 8/1/00 - 10/31/04	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	

SS 04-99-204 After
SCALE: NOT TO SCALE
DATE: 5/19/2005
LOG NUMBER: 20050265

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH